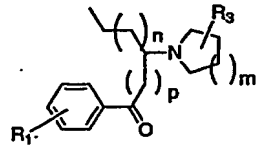
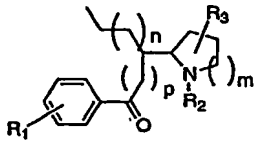
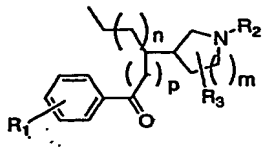
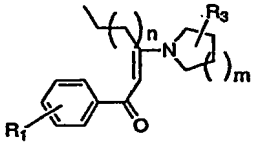
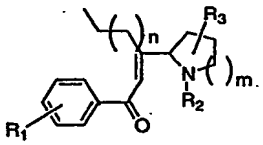
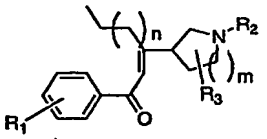
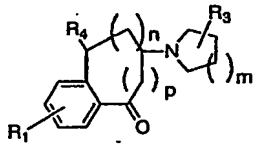
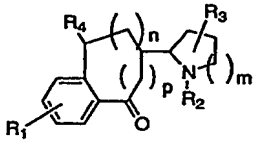
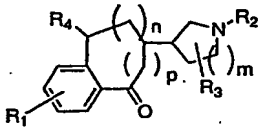
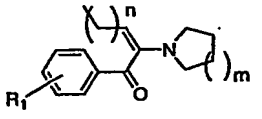
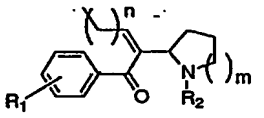
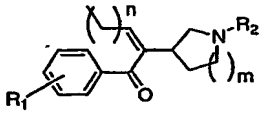
What is claimed is:

1. A compound represented by any of the following formulae:

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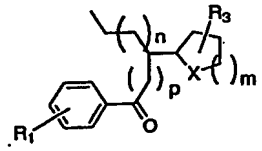
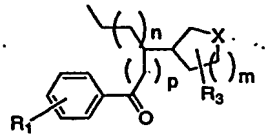
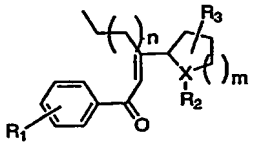
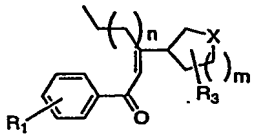
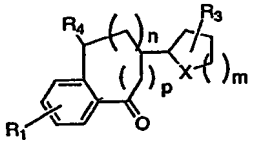
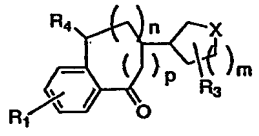
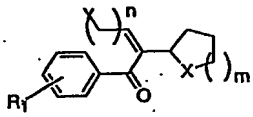
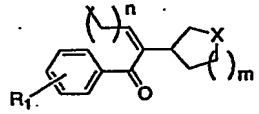
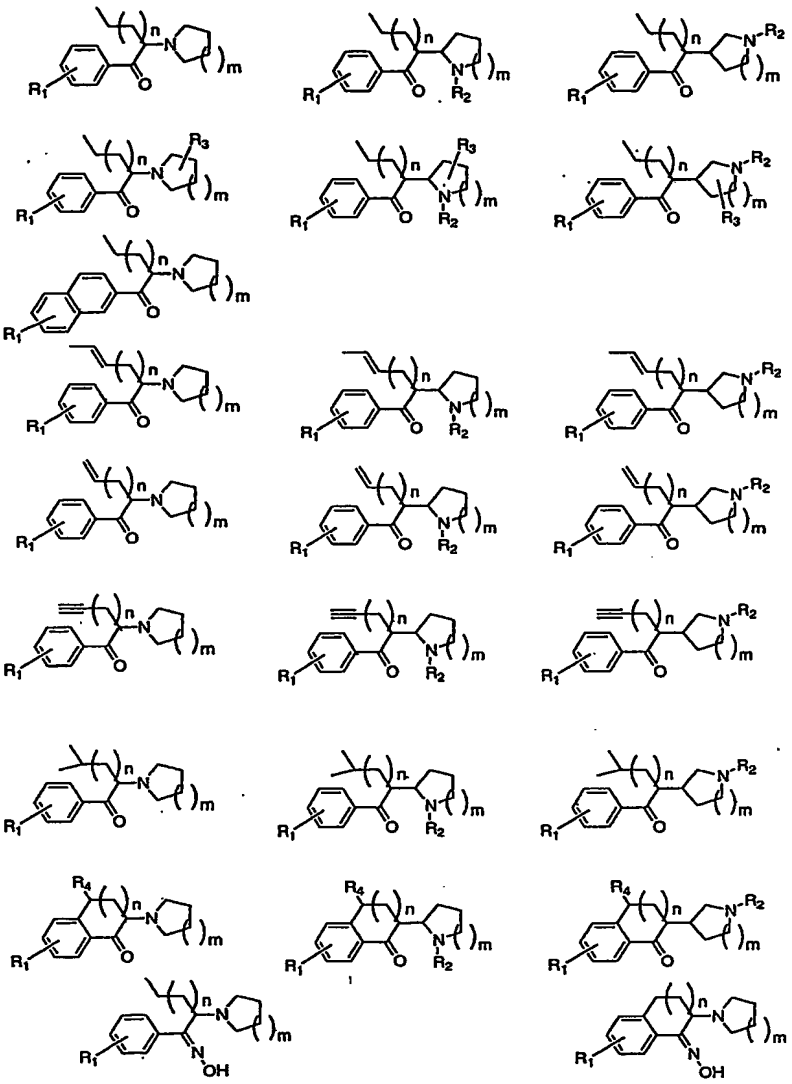
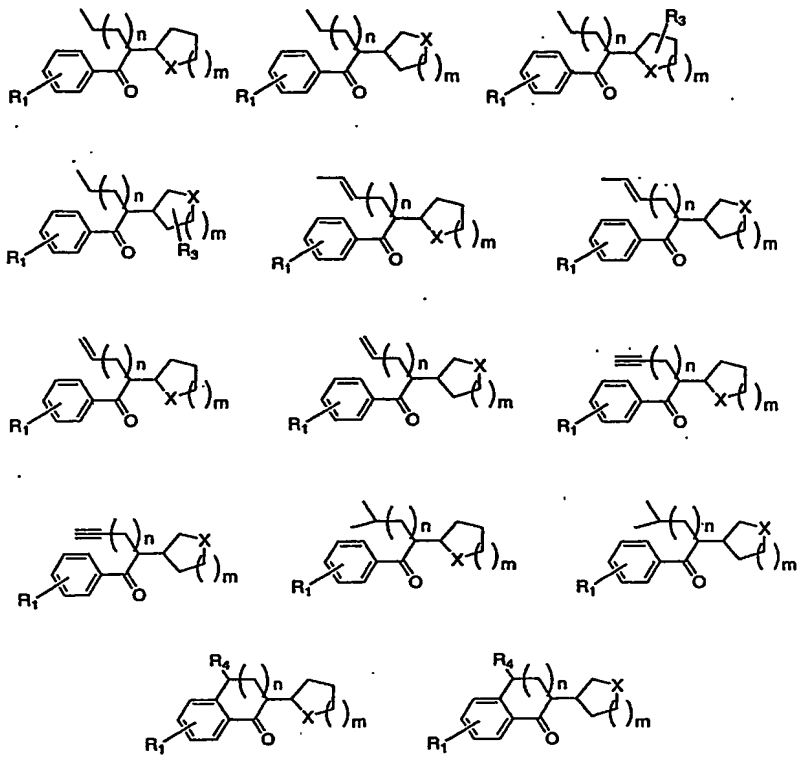













wherein,

R_1 = one to four substituents independently selected from the group consisting of H, halogen, substituted or unsubstituted alkyl, substituted or unsubstituted alkoxy, substituted or unsubstituted alkenyl, substituted or unsubstituted alkenyloxy, substituted or unsubstituted alkynyl, substituted or unsubstituted alkynyloxy, $(CH_2)_n$-Ar, OH, OC(O)-alkyl; CF_3; NO_2; NH_2; CN; $NHCOCH_3$; CO-alkyl, CH_2OH, $(CH_2)_nOR_2$ (in which n is 1 to 4) and$(CH_2)_nOCOR_2$; (in which n is 1 to 4);

R_2 = H, substituted or unsubstituted alkyl, substituted or unsubstituted alkoxy, substituted or unsubstituted alkenyl, substituted or unsubstituted alkenyloxy, substituted or unsubstituted alkynyl, substituted or unsubstituted alkynyloxy, or CH_2ArR_1;

R_3 = one or two substituents independently selected from the group consisting of H, halogen, substituted or unsubstituted alkyl, substituted or unsubstituted alkoxy, substituted or unsubstituted alkenyl, substituted or unsubstituted alkenyloxy, substituted or unsubstituted alkynyl, substituted or unsubstituted alkynyloxy, OH, $(CH_2)_nArR_1$; CF_3; NO_2; NH_2; CN; $NHCOCH_3$, CO-alkyl, CH_2OH, $(CH_2)_nOR_2$ (in which n is 1 to 4) and $(CH_2)_nOCOR_2$ (in which n is 1 to 4);

R_4 = H, substituted or unsubstituted alkyl, substituted or unsubstituted alkoxy (preferably methoxy), substituted or unsubstituted alkenyl, substituted or unsubstituted alkenyloxy, substituted or unsubstituted alkynyl, substituted or unsubstituted alkynyloxy, OH, OC(O)-alkyl; CF_3; NO_2; NH_2; CN; NHCO-alkyl, $COCH_3$, CH_2OH, $(CH_2)_nOR_2$ (in which n is 1 to 4) and$(CH_2)_nOCOR_2$ (in which n is 1 to 4);

Ar is an aromatic group;

n = 0 – 4;

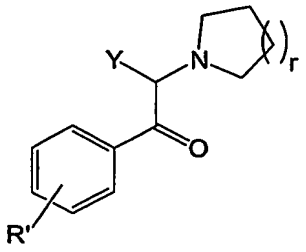
m, p = 0 – 2; and

X = O, CH_2, S, SO_2, or SO;

or a pharmaceutically acceptable salt thereof;

with the proviso that, when the compound is a racemic mixture, the compound is not α-pyrrolidino-valerophenone, pyrovalerone, 1-phenyl-2-pyrrolidino-3-methylbutan-1-one, 1-(p-methoxy-phenyl)-2-pyrrolidino-pentan-1-one, 1-(p-hydroxy-phenyl)-2-pyrrolidino-pentan-1-one, 1-phenyl-2-pyrrolidino-butan-1-one, 1-phenyl-2-pyrrolidino-heptan-1-one, 1-(p-chloro-phenyl)-2-pyrrolidino-pentan-1-one, 1-(m-methyl-phenyl)-2-pyrrolidino-pentan-1-one, 1-phenyl-2-pyrrolidino-nonan-1-one, 1-(p-methoxy-phenyl)-2-pyrrolidino-hexan-1-one, or α-(2'-methyl-pyrrolidino)-valerophenone.

2. A compound represented by the structure:



in which

R' represents one to four substituents independently selected from the group consisting of H, halogen (preferably F, Br, Cl, or I), substituted or unsubstituted alkyl, substituted or unsubstituted alkoxy (preferably methoxy), substituted or unsubstituted alkenyl, substituted or unsubstituted alkenyloxy, substituted or unsubstituted alkynyl, substituted or unsubstituted alkynyloxy, $(CH_2)_n$-Ar, OH, OC(O)-alkyl, CF_3, NO_2, NH_2, CN, $NHCOCH_3$, CO-alkyl, CH_2OH, $(CH_2)_nOR_2$ (in which n is 1 to 4) and $(CH_2)_nOCOR_2$ (in which n is 1 to 4);

Y is an aliphatic group having from 1 to 8 carbons in a straight, branched, or cyclic aliphatic chain, and

r is 1 or 2; or a pharmaceutically acceptable salt thereof;

provided that: when the compound is a racemic mixture, 1) if Y is n-propyl, and r is 1, then R' is not H, 4-methyl, 4-hydroxy, 4-methoxy, 4-chloro, or 3-methyl; and 2) if Y is ethyl, isopropyl, n-butyl, n-pentyl, or n-heptyl, and r is 1, then R' is not H for every occurrence.

3. The compound of claim 2, in which the compound is the 2S- enantiomer.

4. The compound of claim 2, in which R' is selected from the group consisting of 4-F, 4-Br, or 4-I.

5. The compound of claim 2, in which R' represents 3,4-Cl, 3,4-OH, or 3,4-diacetoxy.

6. The compound of claim 2, in which R' is 4-acetamido or R' is 4-nitro.

7. The compound of claim 2, in which R' is 2-methyl or 3-I.

8. The compound of claim 2, in which R' is 4-hydroxymethyl or 4-C(O)O-alkyl

9. The compound of claim 2, in which R' is 4-alkynyl.

10. The compound of claim 2, in which R' is an aromatic ring attached at the 4-position.

11. The compound of claim 2, in which the compound is the 2-R enantiomer.

12. The compound of claim 3, in which R' is 4-methyl.

13. The compound of claim 2, in which the aliphatic group is an allyl group.

14. The compound of claim 2, in which the aliphatic group is an ethyl group.

15. The compound of claim 2, in which the aliphatic group is an isobutyl group.

16. The compound of claim 2, in which the aliphatic group is an n-propyl group.

17. The compound of claim 2, in which r is 1.

18. The compound of claim 2, in which r is 2.

19. The compound of claim 2, in which R' is 3,4-Cl.

20. The compound of claim 2, in which the compound is present as a racemic mixture.

21. The compound of claim 1, wherein the compound is a 2-R enantiomer.

22. The compound of claim 1, wherein the compound is the 2-S enantiomer.

23. The compound of any of claims 1-22, wherein the compound binds and/or inhibits monoamine transporters of mammalian systems.

24. The compound of claim 23, wherein the monoamine transporters are dopamine transporters.

25. The compound of claim 23, wherein the monoamine transporters are serotonin transporters.

26. The compound of claim 23, wherein the monoamine transporters are norepinephrine transporters.

27. The compound of any of claims 1-22, wherein IC_{50} SERT/DAT ratio is greater than about 10, preferably greater than about 30 and more preferably 50 or more.

28. The compound of any of claims 1-22, having an IC_{50} at the DAT of less than about 500 nM, preferably less than 60 nM, more preferably less than about 20 nM, and most preferably less than about 10 nM.

29. The compound of any of claims 1-22, wherein the compound is used to treat a neurochemical disorder related to mammalian monoamine neurotransmitter uptake systems.

30. The compound of any of claims 1-22, wherein the neurochemical disorder is Parkinson's disease, Attention Deficit Disorder, ADHD, depression, cognition, memory disorders, Alzheimer's disease, Obsessive Compulsive Disorder, Tourette's Syndrome, schizophrenia, psychosis.

31. A method for inhibiting 5-hydroxytryptamine reuptake of a monoamine transporter comprising contacting the monoamine transporter with a compound of any of claims 1-22.

32. The method of claim 29, wherein the monoamine transporter is selected from the group consisting of a dopamine transporter, a serotonin transporter and a norepinephrine transporter.

33. A method for inhibiting 5-hydroxytryptamine reuptake of a monoamine transporter in a mammal comprising administering to the mammal a 5-hydroxytryptamine reuptake inhibiting amount of a compound of any of claims 1-22.

34. A method for inhibiting dopamine reuptake of a dopamine transporter in a mammal comprising administering to the mammal a dopamine reuptake inhibiting amount of a compound of any of claims 1-22.

35. A method for inhibiting serotonin reuptake of a serotonin transporter in a mammal comprising administering to the mammal a serotonin reuptake inhibiting amount of a compound of any of claims 1-22.

36. A method for inhibiting norepinephrine reuptake of a norepinephrine transporter in a mammal comprising administering to the mammal a norepinephrine reuptake inhibiting amount of a compound of any of claims 1-22.

37. A pharmaceutical composition comprising a therapeutically effective amount of the compound of any of claims 1-22 and a pharmaceutically acceptable carrier.

38. A method for treating a mammal having a disorder selected from neurodegenerative disease, psychiatric dysfunction, dopamine dysfunction, cocaine abuse and clinical dysfunction comprising administering to the mammal an effective amount of any one of the compounds of any of claims 1-22.

39. A method for treating a mammal having a disorder selected from neurodegenerative disease, psychiatric dysfunction, dopamine dysfunction, cocaine abuse and clinical dysfunction comprising administering to the mammal an effective amount of a compound of any of claims 1-22.

40. A method for treating a neurodegenerative disease in a mammal comprising administering to the mammal an effective amount of a 2-S enantiomer having the formula of any one of the compounds of any of claims 1-22.

41. A method for treating a neurodegenerative disease in a mammal comprising administering to the mammal an effective amount of a compound of any of claims 1-22.

42. The method of claim 41, wherein the neurodegenerative disease is selected from Parkinson's disease and Alzheimer's disease.

43. A method for treating psychiatric dysfunction in a mammal comprising administering to the mammal an effective amount of a compound of any of claims 1-22.

44. The method according to claim 43, wherein the psychiatric disorder comprises depression.

45. A method for treating dopamine related dysfunction in a mammal comprising administering to the mammal a dopamine reuptake inhibiting amount of any one of the compounds of any of claims 1-22.

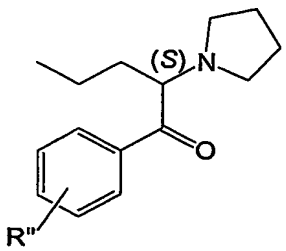
46. The method according to claim 44, wherein the dopamine related dysfunction comprises Attention deficit disorder.

47. A method for treating serotonin related dysfunction in a mammal comprising administering to the mammal a serotonin reuptake inhibiting amount of a compound of any of claims 1-22.

48. The method according to claim 47, wherein the serotonin related dysfunction relates to depression.

49. A method for treating clinical dysfunction in a mammal comprising administering to the mammal an effective amount of a compound of any of claims 1-22.

50. A compound represented by the structure:



in which R'' represents one to four substituents selected from the group consisting of halogen, lower alkyl, lower alkenyl, lower alkynyl, aryl, hydroxy, -CF_3, nitro, amido, -(O)CO-alkyl and –

C(O)O-alkyl;
and pharmaceutically acceptable salts thereof.

51. The compound of claim 50, in which R'' represents 4-alkyl.

52. A compound selected from the group consisting of
1-(4-Propynyl-phenyl)-2-pyrrolidin-l-yl-pentan-l-one
4-Methyl-2-pyrrolidin-1-yl-1 p-tolyl-pentan-1-one
1-(4-Iodo-phenyl)-2-pyrrolidin-1-yl-pentan-1-one
1 -Naphthalen-2-yl-2-pyrrolidin-1 -yl-pentan- 1 –one
2-Pyrrolidin-1-yl-l-m-tolyl-pentan-1-one
2-Pyrrolidin-1-yl-1-o-tolyl-pentan-1-one
2-Pyrrolidin-1-yl-1-(4-thiophen-2-yl-phenyl)-pentan-1-one
2-Pyrrolidin-1-yl-1-(4-furan-2-yl-phenyl)-pentan-l-one
2-Pyrrolidin-1-yl-1-(4-nitro-phenyl)-pentan-1-one
N-[4-(2-Pyrrolidin-1-yl-pentanoyl)-phenyl]-acetamide
2-Pyrrolidin-1-yl-1-(4'-bromo-phenyl)-pentan-l-one
2-Pyrrolidin-1-yl-1-(4'-hydroxy-phenyl)-pentan-1-one
2-Pyrrolidin-1-yl-1-(4'-methoxy-phenyl)-pentan-1-one
1-(3-Iodo-phenyl)-2-pyrrolidin-1-yl-pentan-1-one
2-Pyrrolidin-1-yl-1-(3,4-Dichloro-phenyl)-pentan-1-one
2-Pyrrolidin-1-yl-phenyl-pentan-1-one
2-Pyrrolidin-1-yl-1-(4'-fluoro-phenyl)-pentan-1-one
(*S*)-2-Pyrrolidin-1-yl-1-*p*-tolyl-pentan-1-one
1-(4-Hydroxymethyl-phenyl)-2-pyrrolidin-l-yl-pentan-l-one
4-(2-Pyrrolidin-1-yl-pentanoyl)-benzoic acid methyl ester and
1-(3,4-Dihydroxy-phenyl)-2-pyrrolidin-1-yl-pentan-1-one
and pharmaceutically acceptable salts thereof.

53. The compound 2-piperidin-1-yl-1-(3,4-dichloro-phenyl)-pentan-1-one, or a pharmaceutically acceptable salt thereof.

54. The compound 2-pyrrolidin-1-yl-1-(3,4-dichloro-phenyl)-butan-1-one, or a pharmaceutically acceptable salt thereof.

55. A compound selected from the group consisting of 2-pyrrolidin-1-yl-1 p-tolyl-pent-4-ene-l-one and 1-(3,4-dichloro-phenyl)-2-pyrrolidin-1-yl-pent-4-ene-l –one; or a pharmaceutically acceptable salt thereof.

56. The compound (*S*)-2-Pyrrolidin-1-yl-1-*p*-tolyl-pentan-1-one.

57. The compound (*R*)-2-Pyrrolidin-1-yl-1-*p*-tolyl-pentan-1-one.

58. The compound of claim 1, in which the compound is present as a racemic mixture.

59. A method for inhibiting 5-hydroxytryptamine reuptake of a monoamine transporter comprising contacting the monoamine transporter with a compound of any of claims 50-58.

60. A method for inhibiting 5-hydroxytryptamine reuptake of a monoamine transporter in a mammal comprising administering to the mammal a 5-hydroxytryptamine reuptake inhibiting amount of a compound of any of claims 50-58.

61. A method for inhibiting dopamine reuptake of a dopamine transporter in a mammal comprising administering to the mammal a dopamine reuptake inhibiting amount of a compound of any of claims 50-58.

62. A method for inhibiting serotonin reuptake of a serotonin transporter in a mammal comprising administering to the mammal a serotonin reuptake inhibiting amount of a compound of any of claims 50-58.

63. A method for inhibiting norepinephrine reuptake of a norepinephrine transporter in a mammal comprising administering to the mammal a norepinephrine reuptake inhibiting amount of a compound of any of claims 50-58.

64. A pharmaceutical composition comprising a therapeutically effective amount of the compound of any of claims 50-58 and a pharmaceutically acceptable carrier.

65. A method for treating a mammal having a disorder selected from

neurodegenerative disease, psychiatric dysfunction, dopamine dysfunction, cocaine abuse and clinical dysfunction comprising administering to the mammal an effective amount of any one of the compounds of any of claims 50-58.

66. A method for treating a mammal having a disorder selected from neurodegenerative disease, psychiatric dysfunction, dopamine dysfunction, cocaine abuse and clinical dysfunction comprising administering to the mammal an effective amount of a compound of any of claims 50-58.

67. A method for treating a neurodegenerative disease in a mammal comprising administering to the mammal an effective amount of a 2-S enantiomer having the formula of any one of the compounds of any of claims 50-58.

68. A method for treating a neurodegenerative disease in a mammal comprising administering to the mammal an effective amount of a compound of any of claims 50-58.

69. The method of claim 68, wherein the neurodegenerative disease is selected from Parkinson's disease and Alzheimer's disease.

70. A method for treating psychiatric dysfunction in a mammal comprising administering to the mammal an effective amount of a compound of any of claims 50-58.

71. The method according to claim 70, wherein the psychiatric disorder comprises depression.

72. A method for treating dopamine related dysfunction in a mammal comprising administering to the mammal a dopamine reuptake inhibiting amount of any one of the compounds of any of claims 50-58.

73. The method according to claim 72, wherein the dopamine related dysfunction comprises Attention deficit disorder.

74. A method for treating serotonin related dysfunction in a mammal comprising administering to the mammal a serotonin reuptake inhibiting amount of a compound of any of claims 50-58.

75. The method according to claim 74, wherein the serotonin related dysfunction relates to depression.

76. A method for treating clinical dysfunction in a mammal comprising administering to the mammal an effective amount of a compound of any of claims 50-58.